THE

LITTLE COMPANION.

RULE OF PURE PROPORTION,

OR

IMPROVEMENTS

OF

COMMON ARITHMETIC,

A

New Method of Calculation,

PERFORMED BY

LEWIS JŒRRES.

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PREFACE.

THE method of calculation by the rule of pure proportion, affords the power of performing calculations in whole numbers, even when the question is composed of whole fractions, or number and fractions. By an easy process in the statement, the fractions are rejected, the solution or calculation is performed by the pure proportion of all variation of measure, weight, money, &c., of the whole world, entirely by whole numbers, and in an uninterrupted series. It teaches to obtain, by a succession of pure proportion, an answer to any arithmetical proportional question proposed.

The rule of three, or the rule of proportion, named also the "golden rule," has not this power. By this rule, we are often compelled to make four, five, and more statements, before we are able to obtain the answer required. These proceedings by the common rule of calculation with fractions, render the process circumstantial and confused to the scholar, and difficult to impress on his memory; but the rule of pure proportion teaches in an easy, agreeable, and unavoidable manner, all rules in general, as rule of three, tare, barter, fellowship, interest, reduction, loss and gain, exchange, and others; and even in the solution and statements of these questions, wherein it is now necessary to employ several of these rules, the rule of

pure proportion will suffice; and it also performs the calculation, always without interruption, and in whole numbers.

By this rule all circumstantial calculation of fractional numbers are avoided, and by the shortness in whole numbers more agreeable too, than the circumstantial calculation with compound numbers; and it may be said without hesitation, that the rule of pure proportion affords, in all business of common life, the same easiness as the decimal system does in the science of mathematics.

To enlarge this little work by a long preface, and the recommendation of others, is not the intention of its author. It may speak for itself. It will be found, on examination, to do what it professes, viz.—to teach an easy method of calculation, and to afford interesting and necessary knowledge to all men of business.

The pupil, even when he walks out for recreation, will find a subject for his thoughts, and an agreeable little companion in this work. The amusing variation will afford to the scholar, principles which will enable and animate him to perform questions hitherto unknown in any system of arithmetic; by the knowledge of pure proportion, and true judgment, which this system of figures gives of fractions, the young pupil becomes, in the course of his studies, better prepared for the higher branches of mathematics; and the tutors will not have half the trouble to engraft durable principles of calculation on his memory.

Finally, it may be observed, that the author of this method of calculation has shown a fixed rule, that will not be found in any system of arithmetic—a rule to find the pure proportions of all things. Besides, he has adjusted the necessary pure proportions, in a few pages at the end of the work, and placed there also a few sheets of writing paper, for the purpose that new pure proportions desired and found after this rule, may be neatly traced thereon.

THE AUTHOR.

Philadelphia, 1830.

INTRODUCTION.

The advantages of this mode of calculation consist in its rules of statement and reduction of numbers. Read the following rules and remarks over with attention, and work the questions mentioned, and similar ones, until you fully understand the manner of statement and operation.

In order that the size of the Little Companion may be convenient, I have adopted abbreviations used in arithmetics, and also the following, printed in particular letters, which will be used throughout, in all declensions, numbers, and cases; as M for multiplied, multiplicator, multiplicand, &c., as the sentence requires.

R o P P means Rule of Pure Proportion.
P P „ Pure Proportion.

R o S	means	Rule of Three.
P	„	Proportion.
M	„	Multiplication.
D	„	Division.
Q	„	Question.
A	„	Answer.
S	„	Statement.
N	„	Number.
R S	„	Right Side.
L S	„	Left Side.
L	„	Line.

N 1.

All P composed of whole N without a fraction, are termed P P; when a fraction appears, it is only termed a P.

We have fixed and unfixed P P and P. A fixed P P or P is unchangeable, as lb. 1 = 16 oz. $1 = 100 cts.—these are termed fixed P P or P. Few are only P—the most of them are P P. We have in our country, ft. 16½ = 1 perch, and deg. 1 = 69½ miles; these are *fixed* P, the P P of which would be ft. 33 = 2 perch. and deg. 2 = 139 miles.

Unfixed P P and P originate from unavoidable changes, as, for example, the price of butter or sugar, or the different value of money, at different times.

1 lb. of butter costs 6½ cents—£9 sterling are 40 dolls. You will observe that the butter may have a higher or a lower price, and that the exchange of money may rise or fall, and

therefore these P P and P are said to be unfixed.

By the help of P P and P, the most of our calculations in ordinary business are performed.

N 2.

A P P does not change its value, if it is M or D by a N without any remainder, as the P P of 9 = 12 remains the same, if M by 4, and raised to 36 = 48, or if D by 3, and reduced to 3 = 4. These proceedings change nothing in the value of the P P; that is, 9 bears the same P to 12, as 36 does to 48, or 3 to 4.

N 3.

By the help of reduction, or diminution of P P, we are able to perform solutions of all Q with despatch, and for this purpose a perfect knowledge of the M table is positively necessary, by the help thereof, and by observation of the following remarks, we are able to find, in a sure and easy manner, the common measurer of P P, if a reduction can be made. Suppose it is required to reduce the P P of 54 = 72. The M table says, 6 × 9 = 54, and 8 × 9 = 72. We comprehend here, that 9 is a common measurer for the P P of 54 = 72, and reduces the P P to 6 = 8, which again D by 2 gives 3 = 4, for the meanest P P of 54 = 72. Or let 24 = 84 be the P P, here the M table says 12 × 2 = 24, and 12 × 7 = 84. We see here, that 12 is a common measurer, and reduces 24 = 84 to 2 = 7.

It would be superflous to say more of the M table.

Remark. All N which have a cipher or 5 for the last figure, has 5 for its common measurer.

Remark. All N of which the two last figures can be D by 4, that 4 is a common measurer.

Remark. When you take a lesser N from a greater, and the remainder will D the lesser N, without any remainder, it will also be the common measurer for the meanest P P. This knowledge is necessary for despatch of business, easy calculation, and reduction, but seldom taught in arithmetical systems.

N 4.

For the rules of S by the M and D of fractions, proceed according to the following directions:—

1st. Draw a perpendicular L, and observe that this L signifies, in all positions of S, the same as the sign =.

2d. That all fractions, compound and mixed, as well as whole N, have their place by the M on the R S of the L, as also the dividend; the D only has its place on the L S of the L. This is clear, and will not be misunderstood.

3d. To bring fractions to whole N, the numerator of the fraction remains on its side, and the denominator is put on the other side of the L.

4th. In compound fractions, the figure or the whole N is M by the denominator of the frac-

tion, and the numerator added to them; this product remains on its side, and the denominator is put on the other side of the L.

These simple proceedings are observed in all cases of S, as general rules.

Solutions are made agreeably to directions contained in N 7.

N 5.

In the R o 3, and all other proportional rules, we find that the term upon which the demand lies, always gives the third and last position. Suppose by the R o 3. If 3 yds. cost 7 dolls., what will 15 yds. cost?

3 yds : 7 dolls. : 15 yds.

But in the R o P P, the term on which the demand lies takes the first place.

Example.

What	15 yds.
yds. 3	7 dolls.

The advantages and facility of P P stops not here; it is able to join different rules and P given, in one S, and when calculating in this manner, it is unnecessary to reduce the first and third terms to the same denomination, as in the R o 3. This is done by the positions of P P.

As—If 1 pt. cost 10*d.*, how many £ will 3 hhds. cost?

In this example the demand lies on hhd., and the A required must be £. Hhd., as mentioned

above, gives the first position, on the R S of the L. Observe, that we will then commence on the L S of the L, with the same denomination which always gives the P P as A for the R S; and as soon as the A or denomination required falls on the R S of the L, the S is correct. And if we have the P P in memory as the M table, we may as easily perform the S of P P, ascendant or descendant.

Further remarks on the same Q.

If 1 pt. cost 10*d.*, how many £ will 3 hhds. cost? Hhd. is the first, and £ the last position, or A required; now we go from hhd. descendant by P P to pt., and we receive for 1 pt. after the example, 10*d.* for the A on the R S of the L; now we go from *d.* ascendant to £, and as soon as £ falls on the R S of the L, the S is performed, as here may be seen:—

how many £	3 hhds.
hhd. 1	63 gals.
gal. 1	4 quarts
quart 1	2 pints
pint 1	10 pence
pence 12	1 shilling
shilling 20	1 £

Last position required. Now we can be sure that the S is right, if we have made no error in the positions of P P, because the A or denomination required fell on the R S.

When a Q gives particular P, which could not be joined, according to the rule here given,

they must be placed at the end of the S, after the denomination or A required.

As *A.* buys 742 lbs. of wool on the following conditions—to reduce 5 per cent. tret, and to pay for 1 lb. neat weight 9 shillings at 6 per cent. discount. He sells this wool again to *B.* on the same conditions, with a profit of 20 per cent. How much must *B.* pay *A.* in federal money for the 742 lbs. gross weight of wool. Here the demand lies on 742 lbs. gross weight, and the A on dollars. Say

how many dolls.	742 lbs. gross weight
gross weight lbs. 105	100 lbs. neat weight
neat weight lb. 1	9 shillings
shillings 20	1£
£3	8 dolls.
106	100 dis. } extra
100	120 profit } conditions

You will see, that here the extra conditions, mentioned in the Q for discount and profit, are placed down after you have received the A or denomination, dollars required.

By the R o 3 this Q requires 5 S and more than 5 times the N and time, before you are able to obtain the A required.

By fractional Q the S runs thus—

If $\frac{2}{3}$ of $\frac{4}{5}$ of a yard of muslin cost $\frac{7}{10}$ of $\frac{3}{7}$ of a £, for how many cents must $\frac{1}{4}$ of $\frac{1}{2}$ of a yard be sold to gain 25 per cent?

how many cents 4	1 } yd.
5	4 }
yd. { 4	5
yd. { 5	8
10	7 } £
7	3 }
£3	8 dolls.
dol. 1	100 cents
100	125 gain extra condition.

For the principles of this operation vide N 4.

N 6.

To find the P P of any thing, you may suppose one of them, upon which you lay the demand for the first position, as nothing, and proceed to the other by P P for the A, as

How many £ are dolls.

how many £	— dolls.
dol. 1	100 cents
cents 10	9 pence
pence 12	1 shilling
shillings 20	1 £

Resolve both sides to the meanest denomination, and the remainder gives the P P, and the denominator upon which you have laid the demand falls on the L S of the L, and is sought on the R S of L.

N 7.

In the solution and reduction of P P, observe the following directions—

1st, Strike out all equal N of ciphers.
2d, „ „ „ figures.
3d, „ „ „ N.

4th, Look at the S, if you can D with a figure or N, from one side in the other, strike out both positions, and the quotient remains on the side of the greater N.

5th, Reduction by 5, if 0 and 5 are found at the end of two positions.

6th, Reduction by 4.

7th, And finally reduction by the M table.

As soon as you have finished the reduction according to the above directions, M the remainder of the figures or N of the R S of the L, and do the same with the figures or N of the L S of the L, then D the product of the R S by the product of the L S for the A.

You shall always find the A in the meanest fractional denomination, if the figure or N on the L S is greater than that on the R S, and the A is in this case a fraction, of which the figure or N on the R S is the numerator, and the figure or N the L S the denominator.

If the figure or N on the L S can be D into the product of the R S, the A will always be in whole N with a fraction of the meanest or lowest denomination.

When nothing remains on the L S for a D, the A is always in a whole N.

And when nothing remains, or one, on one or both sides the A is one. But one in all other cases has no value and is not regarded in the calculation, because one is not a M nor a D;

but if one or more ciphers remain, they have then the value of 10, 100, &c.

The scholar is now, I believe, prepared to work Q adapted to the rules which have been taught above. He will find the practice both easy and agreeable. When at a loss refer to N 3, 4, 5, 6, and 7.

MULTIPLICATION.

Vide N 3, 4, and 7.

1 Q. M $12\frac{3}{5}$ by $\frac{1}{3}$ of 7.

5	21
3	1
	7
5	$147 = 29\frac{2}{5}$ A

2 Q. M $3\frac{1}{2}$ by $\frac{3}{5}$ of $\frac{1}{2}$.

2	10 2
5	3
2	1 A

3 Q. M $\frac{2}{3}$ by $\frac{1}{4}$.

3	2
2	1
6	$1 = \frac{1}{6}$ A

4 Q. M $2\frac{1}{3}$ by $1\frac{1}{2}$, and this again by $\frac{1}{2}$ of $\frac{2}{4}$ of $\frac{2}{3}$.

3	7
2	3 4
2	1
4	3
8	$2 = \frac{2}{3}$ A

5 Q. M $\frac{3}{5}$ of 8 by $\frac{7}{8}$ of 5.

5	3
	8
8	7
	5
	21 A

6 Q. M $12\frac{1}{3}$ by $7\frac{2}{3}$.

5	3 3 21
3	23
–	—
5	483=$96\frac{3}{5}$ A

7 Q. M $7\frac{1}{4}$ by $8\frac{1}{2}$.

4	29
2	17
–	—
8	493=$61\frac{5}{8}$ A

8 Q. M $\frac{1}{2}$ of 7 by $\frac{1}{2}$.

2	1
	7
2	1
–	–
4	7=$1\frac{3}{4}$ A

9 Q. M or reduce $\frac{3}{7}$ of $\frac{7}{8}$ of $\frac{8}{9}$ to a single fraction.

7	2
8	7
9	8
–	–
9	2=$\frac{2}{9}$ A

10 Q. M or reduce $\frac{4}{7}$ of $\frac{5}{8}$ of $\frac{7}{9}$ to a single fraction.

8	4
2 8	5
9	7
—	–
18	7=$\frac{7}{18}$ A

11 Q. M or reduce $\frac{3}{4}$ of $\frac{5}{6}$ of $\frac{9}{10}$ to a single fraction.

4	3
2 6	5
2 10	9
—	–
16	9=$\frac{9}{16}$ A

DIVISION.

1 Q. D $\frac{1}{2}$ by $\frac{1}{4}$.

2	1
1	4 2 A

2 Q. D $\frac{1}{2}$ by $\frac{1}{2}$.

2 4	1
1	2
–	–
2	1=$\frac{1}{2}$ A

3 Q. D $\frac{1}{4}$ of 19 by $\frac{2}{3}$ of $\frac{3}{4}$.

4	1
	1 10 9½ A
2	3
3	4

4 Q. D $\frac{2}{3}$ of $\frac{3}{4}$ by $\frac{1}{2}$ of $\frac{2}{3}$.

∅	∅
2 4	∅
1	∅
∅	∅ 1½ A

Note.—The proof is performed by the M and D as in other systems. In this Q the A $2\frac{1}{20}$ is M by the D $\frac{5}{9}$ of 4.

4 ∅∅	4 4½ A
∅	5 and
	4 proof

5 Q. D. $4\frac{5}{9}$ by $\frac{5}{9}$ of 4.

∅	41
5	∅
4	
—	—
20	$41 = 2\frac{1}{20}$ A

MULTIPLICATION AND DIVISION,

OR

DIVISION AND MULTIPLICATION.

1 Q. D. $\frac{1}{4}$ of 19 by $\frac{2}{3}$ of $\frac{3}{4}$ and M. it again by $\frac{1}{3}$ of 6.

4	1
	19 A
∅	∅
∅	4
∅	1
	∅ ∅

∅	10
∅	5
1	∅
10	5
∅	∅ ∅
7	∅
∅	
5	12
	7
—	—
	60 A

2 Q. D $3\frac{1}{3}$ of $\frac{5}{6}$ by $\frac{1}{6}$ of 10. M it by $\frac{5}{8}$ of 9. D it by $\frac{7}{8}$ of 3. M it by $2\frac{3}{5}$ of 7 and give the A.

To obtain the answer of this question in the usual way it would require 4 S. It will be

observed how much shorter the method of P P is. Thus in 4 S 1 Q. & S. D $3\frac{1}{3}$ of $\frac{5}{6}$ by $\frac{1}{6}$ of 10.

ȝ	1ø
ȸ	ƒ $1\frac{2}{3}$ A
1	ȸ
1ø	

2 Q. & S. Now we say M $1\frac{2}{3}$ by $\frac{5}{6}$ of 9.

ȝ	5
8	5
	ȸ 3
–	—
8	75=$9\frac{3}{8}$ A

3 Q. & S. Now we say D $9\frac{3}{8}$ by $\frac{7}{8}$ of 8.

ȸ	⅞ ȸƒ 3ȸ $3\frac{4}{7}$ A
⅞	ȸ
ȝ	

4 Q. & S. Now we say for the A required, M $3\frac{4}{7}$ by $2\frac{2}{5}$ of 7.

⅞	2ƒ 5
ƒ	12
	⅞
–	—
	60 A & proof

RULE OF PURE PROPORTION.

Vide N 3, 4, 5, 7.

1 Q. If 3 yds. cost 7 dolls. what will 15 yds. cost?

	⅄ƒ 5
ȝ	7
–	—
	35 A

	ȝ
1	63 A
1	⅄
1	2
1	1ø
ȝ⅄2	1
2ø	1

2 Q. If 1 pt. cost 10d. how many £ will 3 hhds. cost?

3 Q. *A.* buys 742 lbs. of wool at 5 per cent. reduction for tret;

pays for 1 lb. neat weight 9 shillings at 6 per cent. discount. Sells this wool to *B.* with 20 per cent. profit. How many dolls. must *B.* pay to *A.*?

	7 4 2 7
3 4 4 4	4 0 0
1	9 3
2 0	1
3	8
4 0 0	4 0 0 4
1 0 0	120
	960 A

4 Q. If $\frac{4}{5}$ of $\frac{5}{8}$ of a yd. of muslin cost $\frac{7}{10}$ of $\frac{3}{7}$ of £, for how many cents must $\frac{1}{4}$ of $\frac{4}{5}$ of a yd. be sold to gain 25 per cent.?

4	1
4	4
4	4
4	8 2
2 1 0	7
7	3
3	8
1	1 0 0
1 0 0	1 2 8 2 4 5
	40 A

5 Q. Bought 1 piece of cloth for £16½ at 15 sh. per yd. How many yds. did it contain?

	1
1	3 3 11
2	
1	2 0 2
3 4 4	1
	22 A

6 Q. If 1½ yd. of cloth cost 2½ dolls. how many cents cost 1½ quarter of a yd.?

2	3
4	1
3	2
2	5
1	1 0 0 25
2	125=62½ A

7 Q. The earth being 360 degrees in circumference, turns round on its axis in 24 hours—how far are the inhabitants of the equator carried in one minute, the deg. being 169½ miles?

¢¢	1
4 ¢¢	1
1	1
2	¢¢¢ ¢
8	139=17⅜ A

8 Q. The same, a deg. being 60 geographical miles?

	1
¢¢	1
¢¢	1
1	¢¢¢ 15 A
1	¢¢

9 Q. *F.* has 5⅜ cwt. of sugar at 6¾d. per lb. and will barter with *B.* for tea at 1 dol. 15 cents a lb. How much tea receives *F.* for his sugar?

¢	53
1	¢¢ 56
1	¢¢ ¢
¢	
3 ¢ ¢	1
¢¢	1
¢	¢¢
1	¢¢¢ ¢
23 ¢¢	1
69	2968=43 1/69

The same—shorter.

3 ¢	53
1	¢¢ 56
¢ ¢	¢¢
¢	¢¢
23 ¢¢	1
69	2968=43 1/69

10 Q. If ⅔ of a yd. cost ³/₁₀ of a dol. how many cents cost ⅞ of a yd.?

¢ ¢	7
¢¢	¢
¢¢	3
1	1¢¢ ¢
	21 A

11 Q. When 19⅓ lbs. cost ⁹/₁₀ of a £, how many lbs. can I have for ¼ of a shilling?

	¢
¢	
¢¢	1
3 ¢	1¢
¢	¢¢ ¢¢ ¢ 2
3	2=⅔ A

12 Q. If 8⅛ of a lb. cost ¾ of a £, how

many lb. can I have for 72 cents?

£ 1ϕϕ	72 18 6 A.
8	1
8	8
8	8
8	825

13 Q. If $\frac{3}{4}$ of a yd. be worth $\frac{2}{5}$ of 2 dolls. 28 cts. what is the value of 7 yds.?

	7
8	5
3	2
	8228 76
—	—
3	5 20=817.73⅓ A

14 Q. If ¼ yd. of cloth ⅔ yd. wide cost 2½ dolls. what is the value of 2½ yd. 1½ yd. wide?

2	5
8	8
1	8
3	4
4	9
—	—
2	45=22½ A

15 Q. 9 students spend in 18 days 10¾ £— how many dolls. will 63 students spend in 30 days?

	ϕ8 7
ϕ	30
18	72 4
7	
3	8
—	—
	320 A

16 Q. What is the interest of 320 dolls. 40 cts. for 11⅛ months at 6 per cent. per annum?

	820.40.267
ϕ	67
10ϕ	
12	ϕ
—	—
10	17889=17.88.9

17 Q. What is the interest in dolls. and cents of £648 for 16 months at 5 per cent.?

	ϕ48 216ϕ 72
1ϕϕ	16 4
3 12	5
3	8ϕϕ
—	—
	115.20 A

18 Q. The interest of $2\frac{1}{2}$ years of £500 sterling at 6 per cent. per annum, shall be paid at Philadelphia, exchange at par or $4\frac{1}{2}$ shillings 1 dol.

	50ø
₰	5
1øø	ø2
1	2ø
3ø	₰
3	1000=333⅓

19 Q. How many shillings is the interest of £73 for 25 days at 5 per cent. per an.?

	₰₰
₰ 1øø	₰ø 5 A
₰₰ ₰øø	ø
1	₰ø

20 Q. If $\frac{3}{4}$ of $\frac{4}{5}$ of the cargo of a ship be worth 250 dollars, what is the value of the whole cargo?

	1
3	4
1	4
	250
3	4000=1333⅓ A

21 Q. If $\frac{3}{7}$ of $\frac{4}{5}$ of $\frac{7}{8}$ of a ship be worth $\frac{1}{3}$ of $\frac{6}{7}$ of $\frac{11}{13}$ of the cargo valued at 12,000 dolls., what did both ship and cargo stand the owner in?

	12000 4
₰	₰
₰ ₰	5
₰	₰ 4
3 ø	1
7	ø ₰
13	11
273	880000= 3223$\frac{181}{273}$ dolls. or

₰ 3223.44 3$\frac{61}{273}$m. ship
12000 cargo

₰15223.44 3$\frac{61}{273}$m. A

22 Q. How many dolls. or what fraction of a dol. is $\frac{5}{9}$ of a cent?

9	₰
20 1øø	1
180	1=$\frac{1}{180}$ A

23 Q. How many £ or what fraction of a £ is $\frac{5}{9}$ of a cent?

3 ꝑ	ꝑ
20 ꝑꝑ	1
8	ʒ
480	1=$\frac{1}{480}$ A

24 Q. How many £. or what fraction of a £ is $\frac{1}{5}$ of a d.?

	ꝑ
5	
3 ꝑʒ	1
20	1
300	1=$\frac{1}{300}$ A

25 Q. How many dolls. or what fraction of a dol. is $\frac{2}{3}$ d.?

5	ꝑ
3 ꝑʒ	1
5 ʒꝑ	1
3	ꝑ 2
225	2=$\frac{2}{225}$ A

26 Q. In $1\frac{1}{20}$ of a d. how many cents?

ʒꝑ	ʒꝑ ꝑ ʒ 1½ A
ꝑꝑ ꝑʒ	1
ʒꝑ	1
ʒ	ꝑ ʒ
1	100

27 Q. The same.

ʒꝑ	ʒꝑ ʒ 1½ A
ꝑ	1ꝑ

You will remark here, that we may proceed to the A required by different ways. But we should always go the shortest. The following rule (vide N 6) to find all PP gives the knowledge to do it.

28 Q. What sum Irish currency is worth £4326 of Paris, if the exchange between London and Paris is 36d. per crown, or £3, and Dublin 5 per cent.?

	ꝑʒꝑ 2163
ʒ	ʒꝑ ꝑʒ
ꝑʒ	1
2ꝑ.ʒꝑ	1
100	1ꝑꝑ 21
200	45423=227$\frac{23}{100}$

or £227 2s. 3$\frac{3}{5}$d. A

29 Q. A merchant bought in London

700 ells, at 5 shillings sterling per ell; the cost of transportation and duty of the whole amount was 35 per cent., the exchange at par or 4½ shillings a dol., for how many cents must 1 yard in Philadelphia be sold for to gain 12½ per cent?

	1
ꝑ	¢
1	ꝑ
ꝑ	¢
1	1ϕϕ
1ϕϕ	135 A
¢ꝑ 1ϕϕ	¢¢ꝑ ¢ꝑ
¢	

A merchant who is not acquainted with the R o P P, proceeds by the circumstantial calculation of the R o 3 or by practice; and to find the A required in this Q, he is obliged to make 6 S before he is able to find the A.

As proof for this Q, we will go through the calculations of the 6 S by the R o 3.

1st Q. How many £ sterling 700 ells at 5 shillings?

	7ϕϕ 35
1	5
¢ϕ	1
—	—
	175 A

2d Q. How much 175 at 35 per cent.?

	1ꝑ ¢ꝑ
4.¢ϕ 1ϕϕ	135
4.	945=236¼

3d Q. 236¼ £ sterling, how many dol. a 4½ shillings?

¢4	ϕ4ꝑ 105
1	¢0
ϕ	¢
—	—
	1050 A

4th Q. How much 1050 at 12½ per cent. gain?

	1ϕꝑϕ 21
2.1ϕϕ	225
2	
—	—
4	4725=1181¼A

or $1181 25 cts.

5th Q. 700 ells, how many yds.?

℔℘℘	175
℔	5
–	—
	875 A

6th Q. 875 yds. cost $1181 25 cts., how many cents 1 yd.?

	1
875	1181.25=135 A

For the inverse P P or P, observe only that the two equal denominations are changed, and the demand is laid upon the changed or inversed; then proceed as taught in P P to the A required.

1 Q. If 12 men build a house in 48 days, in what time could 36 men build it?

Inverse the 2 equal denominations, 12 men and 36 men, and lay the demand upon the changed 12 men, as—

℥ ℥℔	℔12
	℔8 16 A

2. Q. Admit that I lend to a friend on his occasion 100 dolls. for 6 months, and he promised me the like kindness, when I desired it; but when I came to request it, he could lend me only 75 dolls. The Q is, how long must I keep the 75 dolls. to recompense my courtesy to him?

After the direct P P the demand would be laid upon 75 dolls., but we inverse or change, and lay the demand upon 100, and proceed thus:—

℥ ℔℔	℔℘℘ 4
	℥ 2
	—
	8 A

3 Q. If I lend my friend 100 dolls. for 6 months, allowing the month to be 30 days, how many days ought he to lend me 1000 dolls?

	1¢¢
1¢¢¢	6
1	3¢
	18 A

4 Q. If for 48 shillings, 225 cwt. be carried 512 miles, how many hundred weight may be carried sixty-four miles for the same money?

~~£~~	~~£~~ 8
~~£~~	225
	1800 A

5 Q. If when wheat is 83 cents per bushel, the cent loaf weighs 9 oz., what ought it to weigh when wheat is 1 dol. 24½ cents?

~~$~~	~~$~~
~~$~~ ~~24~~	2
	~~$~~ 3
	6 A

6 Q. There is a cistern having a cock which will empty it in 12 hours. I demand how many cocks of the same capacity there must be to empty it in a quarter of an hour?

	12
1	4
	1
	48 A

To find P P of all things.—Vide N 6.

1 Q. How many £ are dol., or P P of £ and dol.?

	—
1	1¢¢
1¢	~~$~~ 3
4 ~~12~~	1
2¢	1
~~$~~8 = 3 £ A	

2 Q. P P of £ sterling and dol. if 4½ shillings 1 dol.

	—
1	20
9	2
£ st. 9=40 dolls.	

3 Q. P P of £ Flem-

ish and dol. If 33½ sh. Flem. are 1 £ st. and 4½ sh. sterling 1 dol.

1	2ϕ
1ϕϕ	ʒ
	1
1	2ϕ
3 ϕ	2

£ Flem. 3 = 8 dolls.

4 Q. P P of guilder Flemish and dollar. Same exchange, 6 guilder or florin being 1 £ Flem.

ʒ ʒ	1
1	2ϕ
1ϕϕ	ʒ
	1
1	2ϕ
9	2

g. Flem. 9 = 4 dolls.

5 Q. P P of £ sterling and £ of Pennsylvania exchange at 4½ shillings.

1	2ϕ 5
3 ϕ	ʒ
4 ʒ	ʒ

£ st. 3 = 5 £ Pa.

6 Q. P P of yard and English ell, if 5 quarters yard 1 ell.

1	5
4	1

En. ell 4 = 5 yd.

7 Q. P P of yd. and ell of Hamburg, if 2½ quarter of a yard is 1 ell of Hamburg.

1	5
2	
4	1

Ha. ell 8 = 5 yd.

8 Q. P P of £ of South Carolina and Pennsylvania, if 4⅔ sh. is 7½.

14 | 3
2 | 15

£ of S. C. 28=45 £ P.

9 Q. P P of £ of S. Carolina and dol.

1 | 4/4 7
3 |
4/0 | 1

dol. 30=7 £ S. C.

10 Q. P P of £ of N. York and dol., 8 sh. a dol.

1 | 4/0 5
2 4/ | 1

£ N. Y. 2 = 5 dolls.

11 Q. P P of £ of N. York and £ of Pa. at 8 sh. and 7½ sh. a dol.

1 | 4/0
8 | 15
2 |
4/0 | 1

£ N. Y. 16=15 £ Pa.

12 Q. P P of £ of Virginia and £ of Pennsylvania, at 6 sh. and 7½ sh.

2 4/ | 4/ 5
2 |

£ Va. 4=5 £ Pa.

13 Q. P P of £ of Virginia and dol.

1 | 4/0
3 4/ | 1

£ of Va. 3=10 dol.

14 Q. P P of £ of Paris and dol., if exchange from Paris to London is 10 d., and from London 4½ sh.

1 | 4/0 5
3 4/ 4/ | 1
9 | 4/

£ of Paris 27=5 dolls.

15 Q. P P of ell of Paris and Pennsylvania, if 7 ells Paris

are 12 ells Flem., 5 ells Flem. 3 ells English, 4 ells English 5 yds.

7	12 3
5	8
4	5

ells of Par. 7 = 9 yds.

By this rule all P P of measure, length, height, weight, money, &c., may be found of all places of the whole world.

Suppose the P P of any thing from Mexico to Philadelphia would be required, and we should know the P P from Mexico to Spain, from Spain to France, from France to Italy, from Italy to Russia, from Russia to Germany, from Germany to Holland, from Holland to England, and only the P P from England to Philadelphia would be known, then we go through all these P P, and find the direct P P between Mexico and Philadelphia, and are then able to find the direct P P of all the places here mentioned.

Thousands of Q upon this rule and the foregoing rules may be given, but this work shall serve as a Little Companion to all men of business, tutors, and pupils, and teach only the easy method of P P calculation, which gives from itself the power to propose any Q, and to proceed by the sure way of P P to the answer desired.

TROY WEIGHT.

Pound. lb.	Ounce. oz.	Pennyweight. dwt.	Grain. gr.
1	12	240	5760
	1	20	480
		1	24

By this weight gold, silver, jewels, and liquors, are weighed.

AVOIRDUPOIS WEIGHT.

Ton. T.	Hundred weight. cwt.	Quarter. qr.	Pound. lb.	Ounce. oz.	Dram. dr.
1	20	80	2240	35840	573440
	1	4	112	1792	28672
		1	28	448	7468
			1	16	256
				1	16

By this weight are weighed things of a coarse drossy nature, that are bought and sold by weight, and all metals but silver and gold.

APOTHECARIES' WEIGHT.

Pound. lb.	Ounce. ℥	Dram. ʒ	Sruple. ℈	Grain. gr.
1	12	96	288	5760
	1	8	24	480
		1	3	60
			1	20

By this weight apothecaries mix their medicines, but buy and sell by avoirdupois weight.

THINGS BOUGHT AND SOLD BY THE DOZEN, GROSS, &c.

Great gross. g. grs.	Common gross. gro.	Dozen. doz.	Particulars. prs.
1	12	144	1728
	1	12	144
		1	12

LONG MEASURE.

Circle.	Degree.	League.	Geographical Miles.	Statute Miles.	Furlong.	Perch.	Yard.	Foot.	Inch.	Barley Corns.
1	360	7900	21600	25020	172800	6912000	36010000	114030000	1368360000	4105080000
	1	20	60	69½	480	19200	105600	316800	3810600	11431800
	2			139						
		1	3		24	960	5280	15840	190080	570240
			1		8	320	1760	5280	63360	190080
					1	40	220	660	7920	23766
						1	5½	16½	198	594
						2	11	33	396	1188
							1	3	36	108
								1	12	36
									1	3

69½ statute miles 1 degree—25020 miles earth's circle.
A hand is a measure of four inches.
A fathom is a measure of 6 feet.

CLOTH MEASURE.

Yard. yd.	Quarters. qr.	Nail. na.	Inches. in.		Ell.	Yard.
1	4	16	36	Flemish	4	3
	1	4	9	English	4	5
		1	$2\frac{1}{4}$	Hamburg	8	5

LIQUID MEASURE.

Tun. T.	Pipes. pi. or bt.	Hogsheads. hhd.	Gallons. gal.	Quarts. qt.	Pints. pt.
1	2	4	252	1008	2016
	1	2	126	504	1008
		1	63	252	126
			1	4	8
				1	2

LAND MEASURE.

Acre. A.	Rood. R.	Perch. P.	Yard. yd.	Foot. ft.
1	4	160	4840	43560
	1	40	1210	10890
		1	30¼	272¼
		4	121	1089
			1	9

DRY MEASURE.

Bushel. bu.	Peck. P.	Quart. qt.	Pints. pt.
1	4	32	64
	1	8	16
		1	2

TIME IN COMMON LIFE.

Year.	Month.	Week.	Day.	Hours.	Minutes.	Seconds.
1	12	52	365	8760	525600	19536000
	1	4				
		1	7			
			1	24	1440	86400
				1	60	3600
					1	60

1 year 365 days 6 hours
13 lunar months 1 day 6 hours } nearly.

MOTION, OR CIRCLE MEASURE.

Circle.	Sine.	Degree. °	Minute. ′	Second. ″
1	12	360	21600	1296000
	1	30	1800	108000
		1	60	3600
			1	60

Nomenclature.	Pennsylvania.	New York.	Virginia.	South Carolina.
Liv.=dol.	3= 8	2= 5	3=10	7= 30
Shil.=cents.	3=40	2=25	3=50	7=150
Denr.=cents.	9=10	24=25	18=25	14= 25

Liv.	Penn.	15=16	New York	N. Y.	16=15 Pennsylvania.
		5=4	Virginia		4=3 Virginia.
		45=28	S. Carolina		12=7 S. Carolina.
	Va.	4=5	Pennsylvania	S. C.	28=45 Pennsylvania.
		3=4	N. York		7=12 N. York.
		9=7	S. Carolina		7=9 Virginia.